

Utility of ^{99m}Tc -MDP SPECT-CT for the diagnosis of sesamoiditis as cause of metatarsalgia

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ABSTRACT

Metatarsalgia is a general term for pain in the area of the metatarsophalangeal joints. Sesamoiditis is an uncommon cause of metatarsalgia. It is pain at the sesamoid bones beneath the head of the first metatarsal with inflammation or fracture. The diagnosis is usually clinical, with localized tenderness on palpation. Diagnosing the cause of metatarsalgia in patients without this classical sign is difficult. We present here such a case of a 37-year-old lady in whom sesamoiditis was diagnosed with technetium-99m (^{99m}Tc)-methylene diphosphonate (MDP) single photon emission tomography-computed tomography (SPECT-CT).

Keywords: Methylene diphosphonate, sesamoiditis, single photon emission tomography-computed tomography

INTRODUCTION

Pain in the first metatarsal sesamoid is an underdiagnosed clinical entity that may contribute up to 4% of overuse-type foot injuries.^[1,2] Sesamoiditis maybe defined as inflammation of the sesamoid bones and/or apparatus due to varied biomechanical and nonmechanical factors causing pain in the anatomical region of the sesamoids.^[1,3] The pain of sesamoiditis maybe a dull aching type or a sharp throbbing type of pain, usually of insidious onset, and may prevent the patient from walking. It maybe over one or both the sesamoids, although the medial one is involved more frequently. Point tenderness is elicitable over the inflamed bone, usually over the inferior and medial aspect of the ball of the great toe. However, this may not always be present as was the case in the present study. Under such circumstances, diagnosis maybe very difficult. Routine radiological imaging is not of much help in such patients. We present here such a case and the utility of ^{99m}Tc -methylene diphosphonate (MDP) single photon emission tomography-computed tomography (SPECT-CT) in making an accurate diagnosis.

CASE REPORT

A 37-year-old lady was sent for a ^{99m}Tc -MDP bone scintigraphy for evaluation of nonspecific pain in the right foot. She was nondiabetic. The pain was not localized; it was aggravated with walking. She gave a history of wearing high heels. There was no history of trauma. On clinical examination, no point tenderness was elicitable. Radiographs of the right leg and foot were unremarkable. Three-phase bone scintigraphy was done after intravenous injection of 740 MBq (20 mCi) of ^{99m}Tc -MDP. Flow [Figure 1a] and pool images [Figures 1b and c] of the feet were unremarkable. Delayed planar imaging acquired three hours after radiotracer injection showed a faint focal area of tracer uptake in the region of the right great toe [Figure 1d]. SPECT-CT images of bilateral feet were acquired on a dedicated SPECT-CT system (Symbia T6, Seimens Medical Solutions, USA). CT images were unremarkable [Figure 2a]. SPECT [Figure 2b] and SPECT-CT [Figure 2c] images showed focally increased radiotracer uptake in the lateral right sesamoid bone. Volume-rendered SPECT-CT image [Figure 3] showed the radiotracer uptake in the right lateral sesamoid bone. Based on SPECT-CT findings, a diagnosis of sesamoiditis was made. The patient underwent a change of footwear and used specifically advised shoes having insoles with sesamoid protective padding.^[3] Pain was much relieved at three months follow-up.

DISCUSSION

The sesamoid bones are usually two seed-shaped bones (medial

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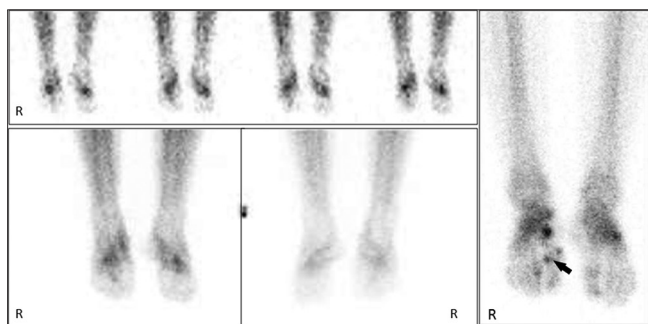


Figure 1: ^{99m}Tc methylene diphosphonate (MDP) planar scintigraphy images of the patient. Flow (a) and pool (b) Anterior; (c) Posterior) images are unremarkable. On delayed images, mild focal uptake noted in the region of great toe (arrow) [R: Right]

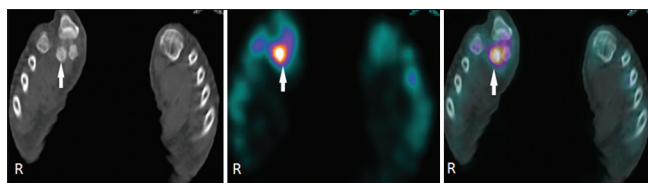


Figure 2: Single photon emission tomography-computed tomography (SPECT-CT) images of feet. CT images (a) do not show any abnormality of right lateral sesamoid (arrow). SPECT (b) and SPECT-CT (c) images show focal uptake of radiotracer in right lateral sesamoid (arrow) [R: Right]

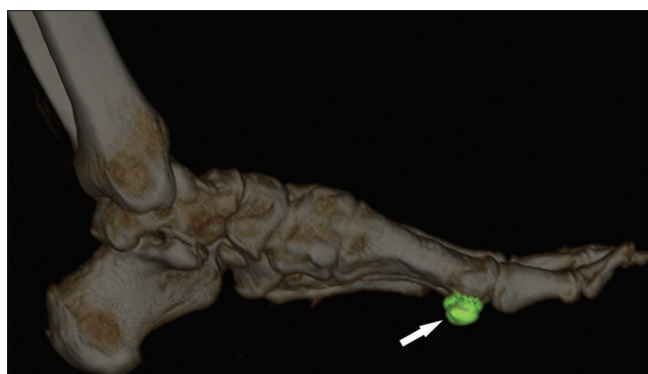


Figure 3: Volume-rendered ^{99m}Tc methylene diphosphonate (MDP) single photon emission tomography-computed tomography (SPECT-CT) images of right foot. The volume of focal uptake of SPECT (arrow) is superimposed on the volume-rendered CT images. Characteristic pattern of uptake in the sesamoid bone is seen

or tibial and lateral or fibular) that lie below the first metatarsal head, embedded in the two tendons of the split flexor hallucis brevis. They are both parts of true synovial joints with hyaline cartilage interfaces. Their location allows them not only to modify the pressure of weight bearing but also to provide a biomechanical advantage during walking.^[4] Sesamoid disorders account for 9% of foot and ankle injuries and 1.2% of running injuries.^[5] Although anyone can suffer from a sesamoid disorder, chronic sesamoid afflictions seem to occur more frequently in active patient populations. Given the myriad disorders that may affect the first metatarsophalangeal joint (MTPJ), sesamoid disorders are often a diagnosis of exclusion and so it is important to evaluate this condition thoroughly and follow the clinical course closely.

Sesamoiditis is a generalized term for a painful inflammatory condition associated with a sesamoid complex devoid of radiographic changes. It is usually attributed to stressful mechanical activities. Teens and young adults have a higher predilection for this disorder. Factors that increase susceptibility include a plantar flexed first ray, asymmetry in size, condylar malformation, rotational malalignment, and symmetric enlargement. Physical examination can reveal pain with direct palpation or passive distal push on the sesamoid apparatus, passive dorsiflexion of the hallux, and crepitus along the distal course of the flexor hallucis longus. There may be edema, bursal thickening, and inflammation plantarily. The differential diagnosis of first metatarsal sesamoid pain is varied and includes inflammatory bone disease, for example, rheumatoid arthritis or bony infection, ligamentous or tendinous disruption, avascular necrosis or osteochondritis, stress fractures, sesamoiditis, and osteoarthritis, normally occurring in a bipartite sesamoid and gout.^[6]

The first investigation for sesamoid disorders is usually a radiograph. Generally, weight-bearing radiographs are obtained. A sesamoid axial view allows inspection of the sesamoids, cristae, and the position of the sesamoidal apparatus.^[7] However, they are of no help in sesamoiditis and are usually normal, as in the present case. Hence, ancillary imaging maybe warranted. A CT scan can assist the clinician in diagnosing a stress fracture or nonunion, and can delineate post-traumatic changes compared with the contralateral part.^[8] However, its utility in the diagnosis of sesamoiditis appears limited. Magnetic resonance imaging (MRI) offers little in the direct diagnosis of sesamoid disorders, but does provide clues to the surrounding first MTPJ disorders including flexor hallucis tendonitis, plantar plate disorders, osteochondral injury, or gout.^[5]

Although other imaging modalities are of limited use, ^{99m}Tc -MDP bone scintigraphy maybe useful for sesamoiditis.^[9] However, it is to be remembered that uptake of ^{99m}Tc -MDP is seen only in 26-29% of asymptomatic patients.^[10] Hence, it might not be very useful in asymptomatic patients. Moreover, because of its limited anatomical resolution, it is not able to accurately localize the site of radiotracer uptake to the sesamoid bone. This is especially problematic if the radiotracer uptake is less intense, as in the present case. On planar scintigraphy, a faint focus of tracer uptake was noted in the region of the great toe; however, we were not able to localize its site as well as to determine its clinical significance because of faint uptake. SPECT-CT helped immensely. First, it localized the uptake to the right lateral sesamoid, and second, by correcting for attenuation, it increased the uptake. Volume-rendered SPECT-CT images increased the diagnostic confidence. SPECT-CT has already been shown to be useful for foot arthritis.^[11,12] However, to our knowledge, no published literature exists regarding its utility in sesamoiditis.

Conservative treatment for chronic sesamoiditis includes rest, ice, nonsteroidal anti-inflammatory medications, and custom-modified orthosis.^[3,8] These conditions are often caused by repetitive stress, and correcting any abnormal biomechanical influences is the key to long-term success. This correction can

be done in a variety of ways including modification of activity, custom-modified orthoses, gel inserts under the sesamoids, a metatarsal bar, or an OrthoWedge shoe. In resistant cases, surgery maybe the only option. In the present case, the patient was advised specifically designed shoes having insoles with sesamoid-protective padding, and the condition improved.

Sesamoiditis is an uncommon but treatable cause of metatarsalgia. In patients presenting with nonspecific symptoms, the diagnosis maybe difficult. The present report highlights the utility of ^{99m}Tc -MDP SPECT-CT in identifying sesamoiditis as a cause of foot pain. Awareness of this fact will help in early diagnosis and proper management of such patients.

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